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Connelly

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[54] **RESILIENT TYPE EXERCISING DEVICE WITH REMOVABLE WEIGHTS**

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[51] **Int. Cl.**[3] **A63B 21/00**

[52] **U.S. Cl.** **272/134;** 272/136; 272/142; 272/143; 272/144; 272/140; 272/117

[58] **Field of Search** 272/117, 136, 138, 142, 272/143, 144, 93, 134

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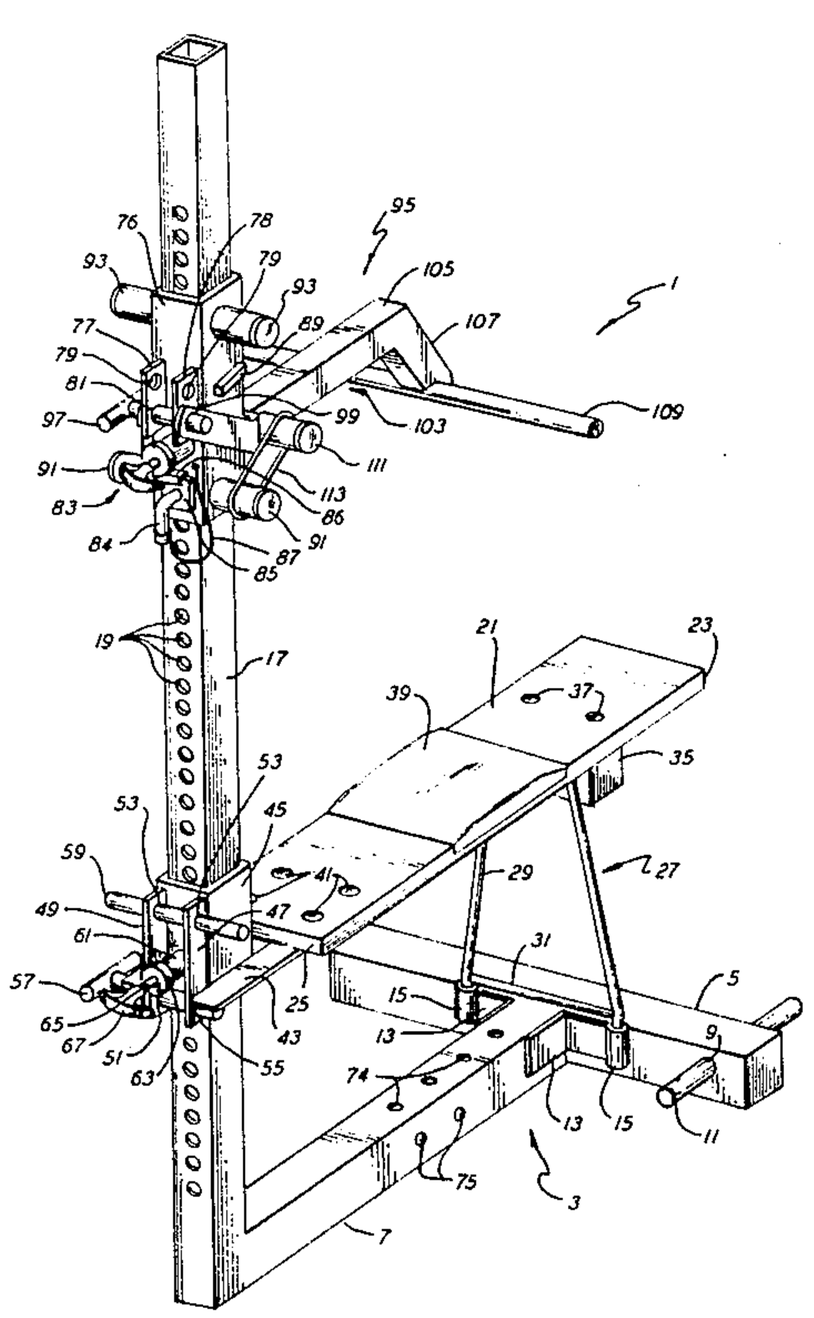
Attorney, Agent, or Firm—Squire, Sanders & Dempsey

[57] **ABSTRACT**

Physical exercise apparatus is disclosed that has a column, a sleeve slidably engaging and lockable at selected positions along the column, a lever pivotally connected to the sleeve and a removable bench connected to the column. Endless elastic bands or torsional springs may be attached to the lever and to the sleeve to provide variable resistance to pivoting of the lever or the lever may be connected to the sleeve so as to restrict pivoting of the lever.

8 Claims, 9 Drawing Figures



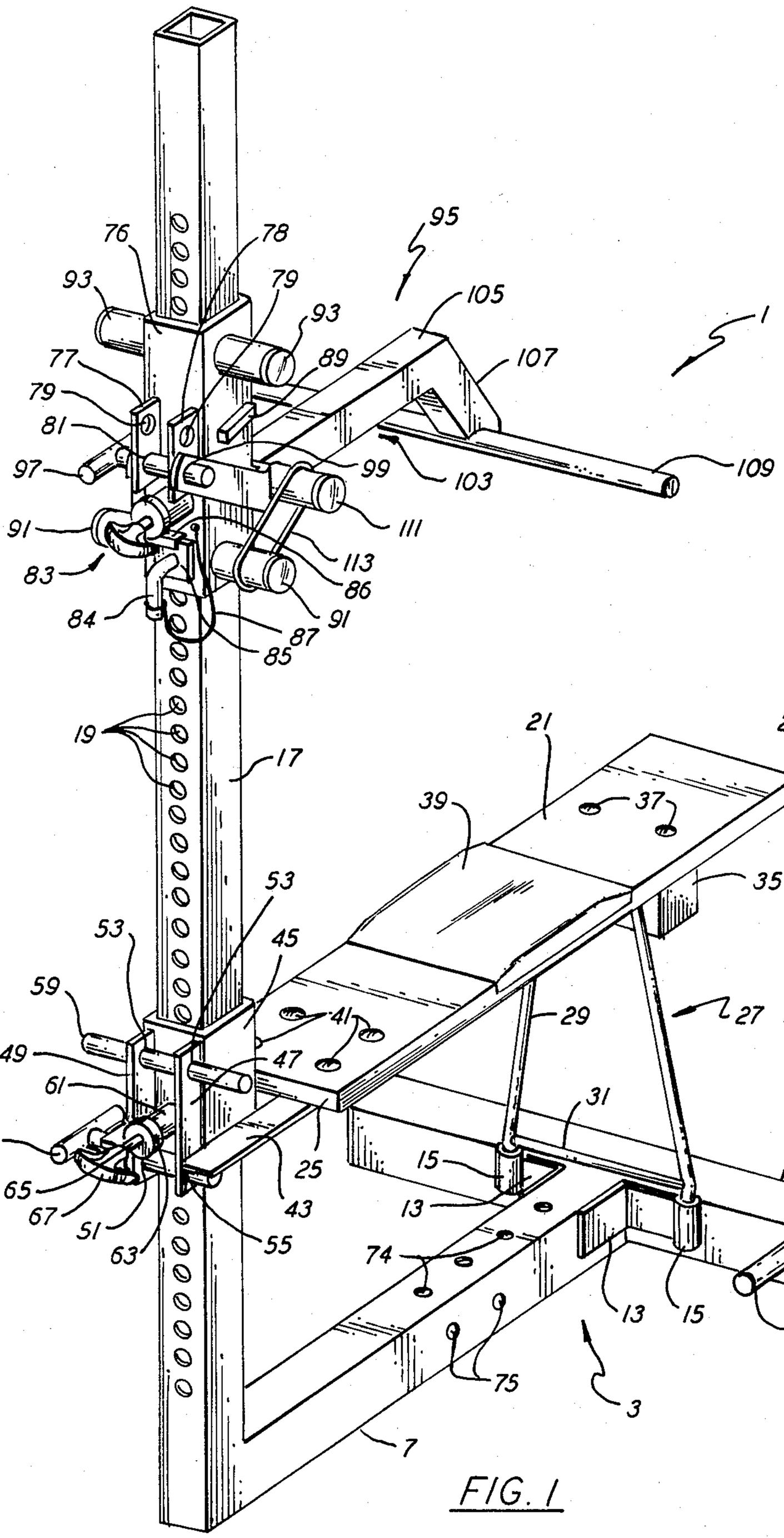

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FIG. 1

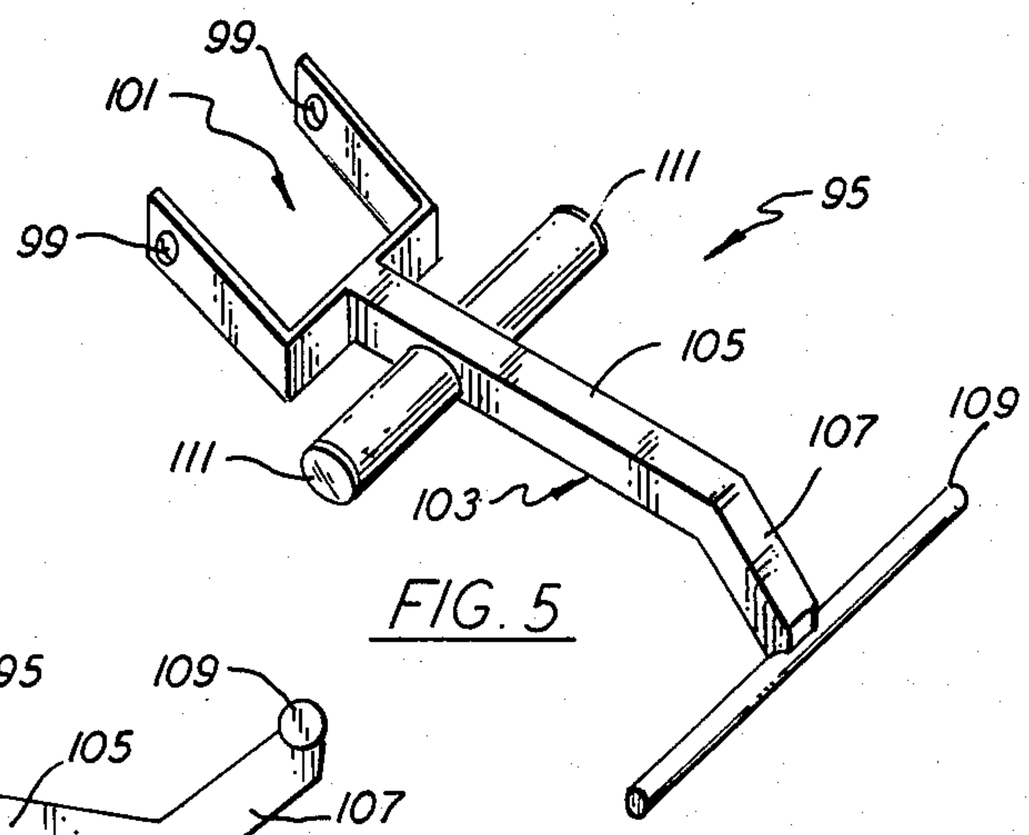

FIG. 5

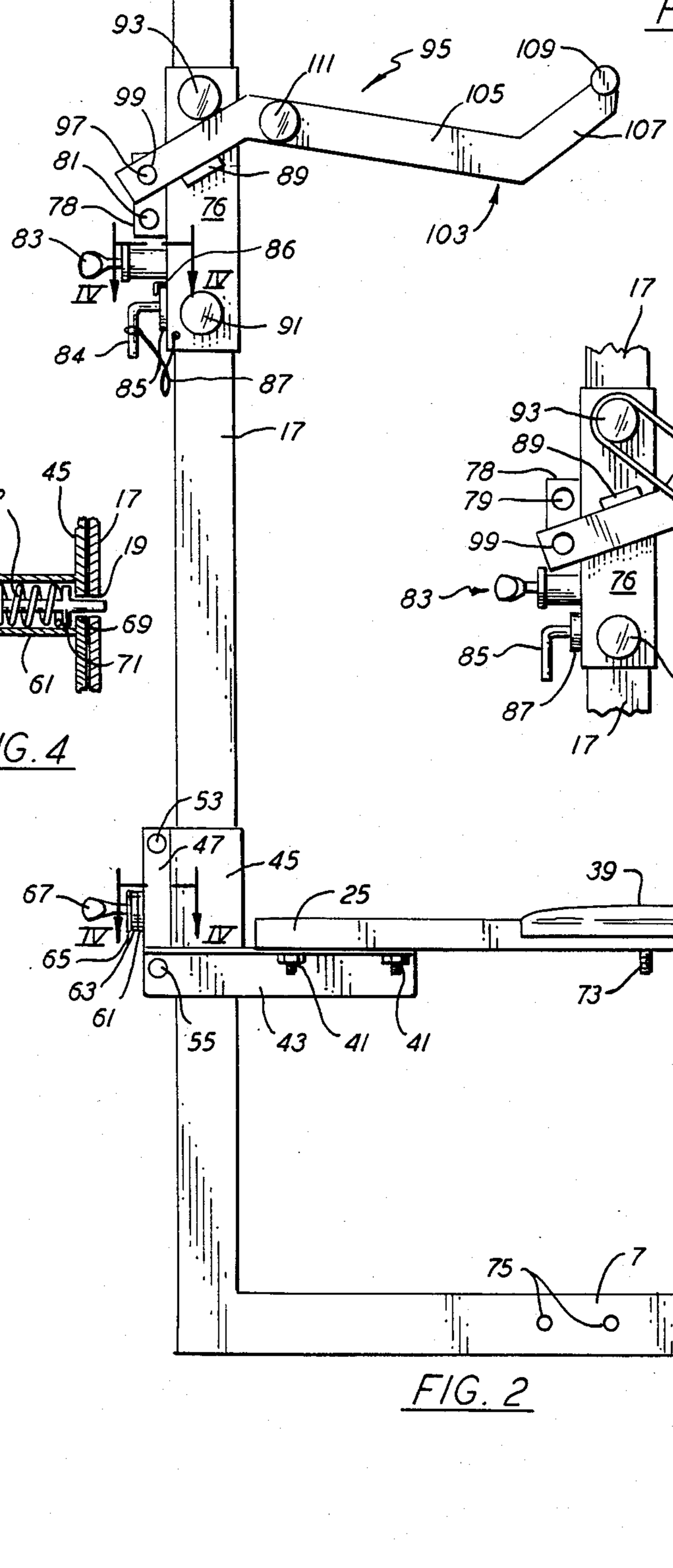

FIG. 4

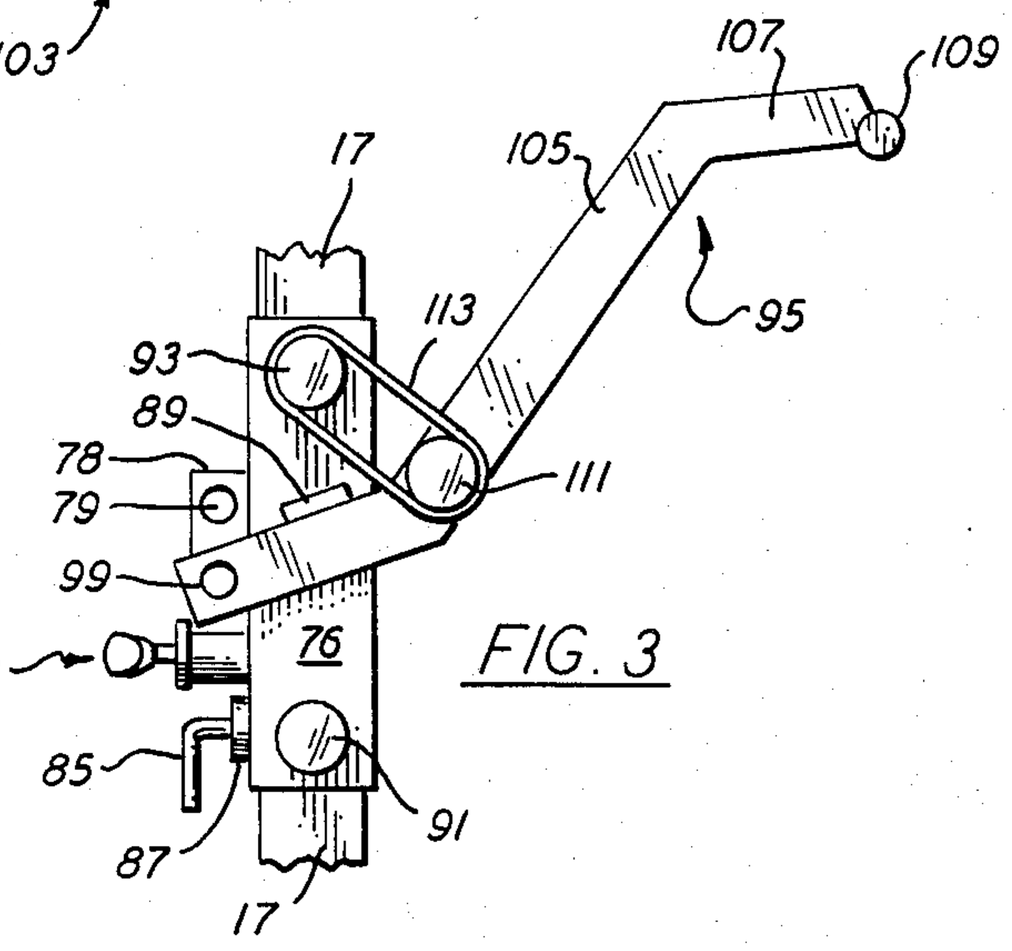

FIG. 3

FIG. 2

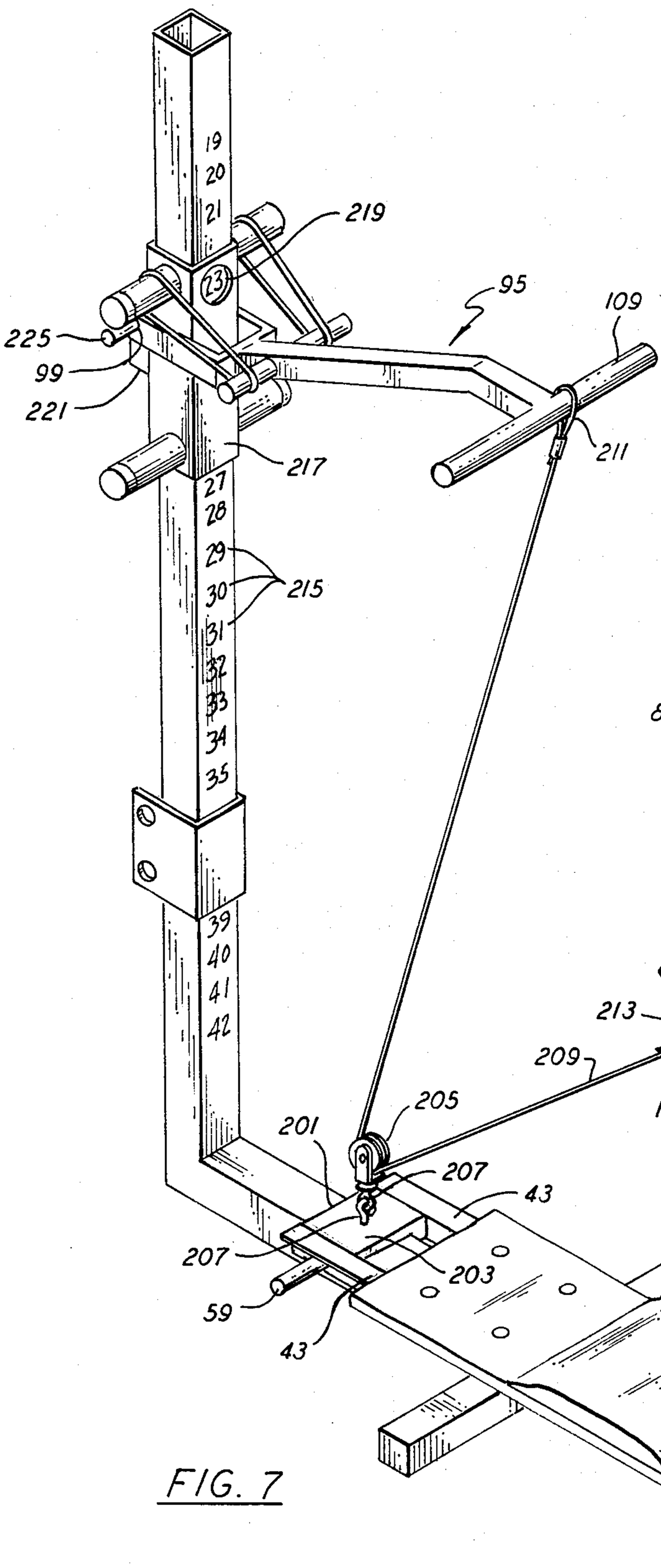
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FIG. 7

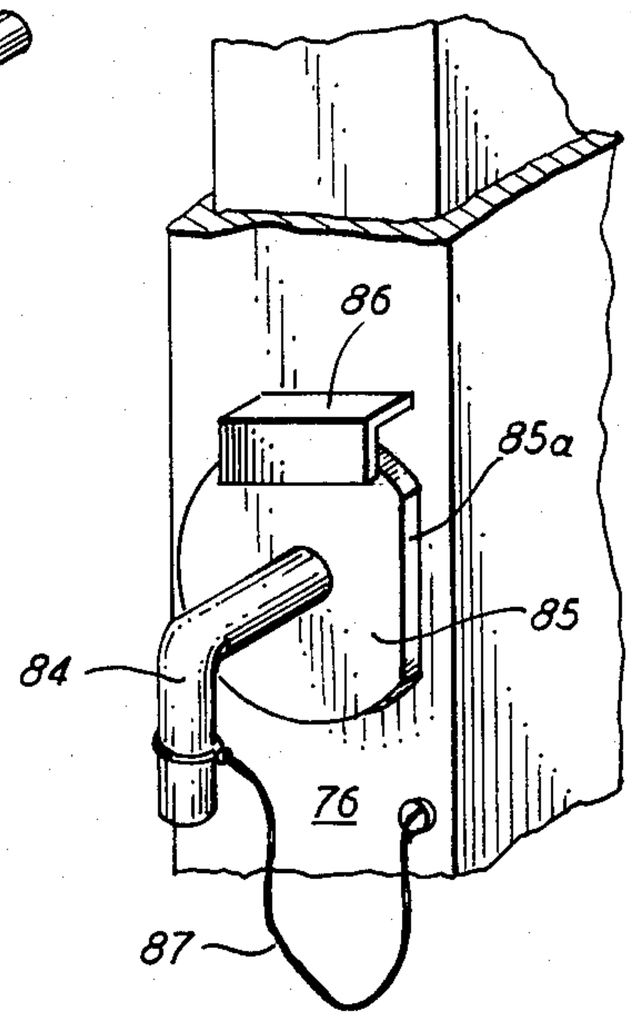
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FIG. 6

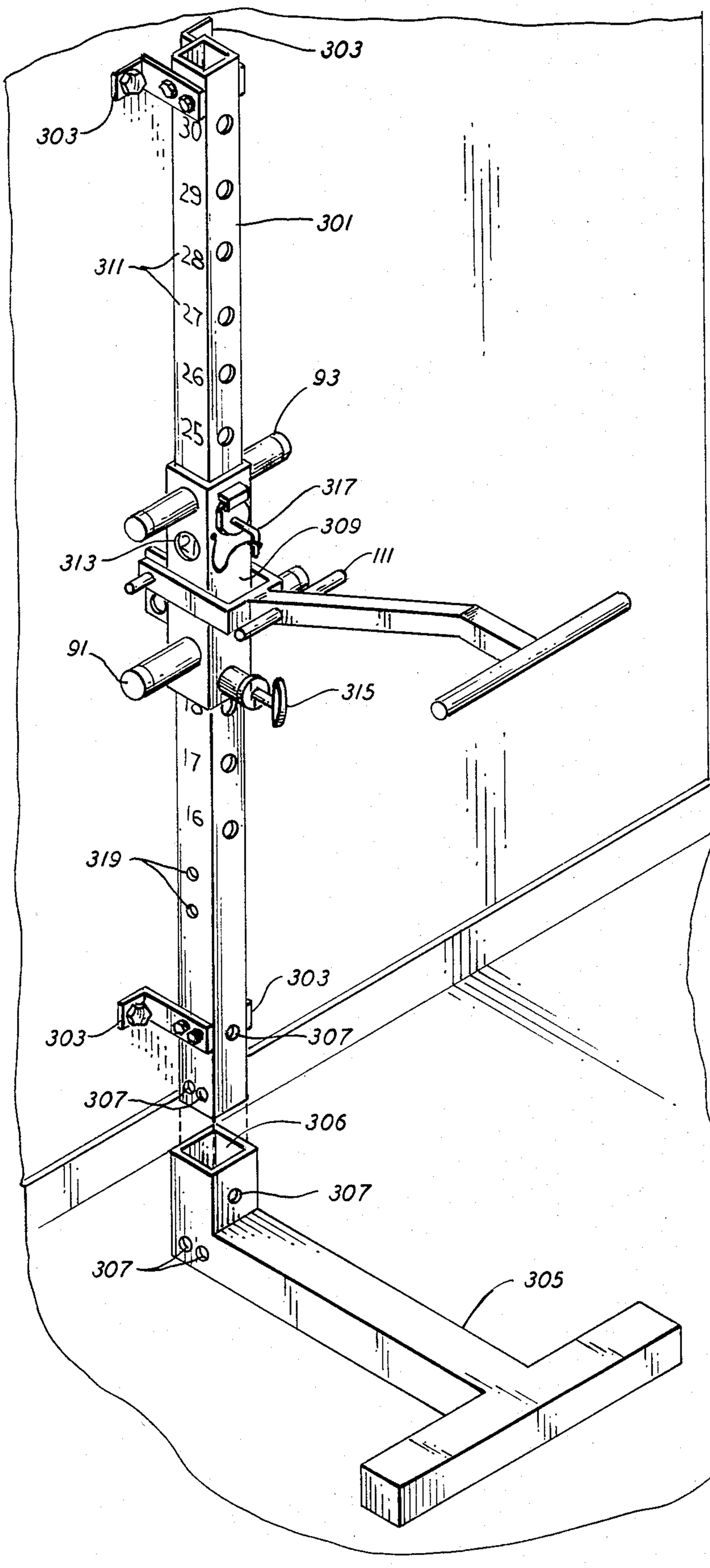
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FIG. 8

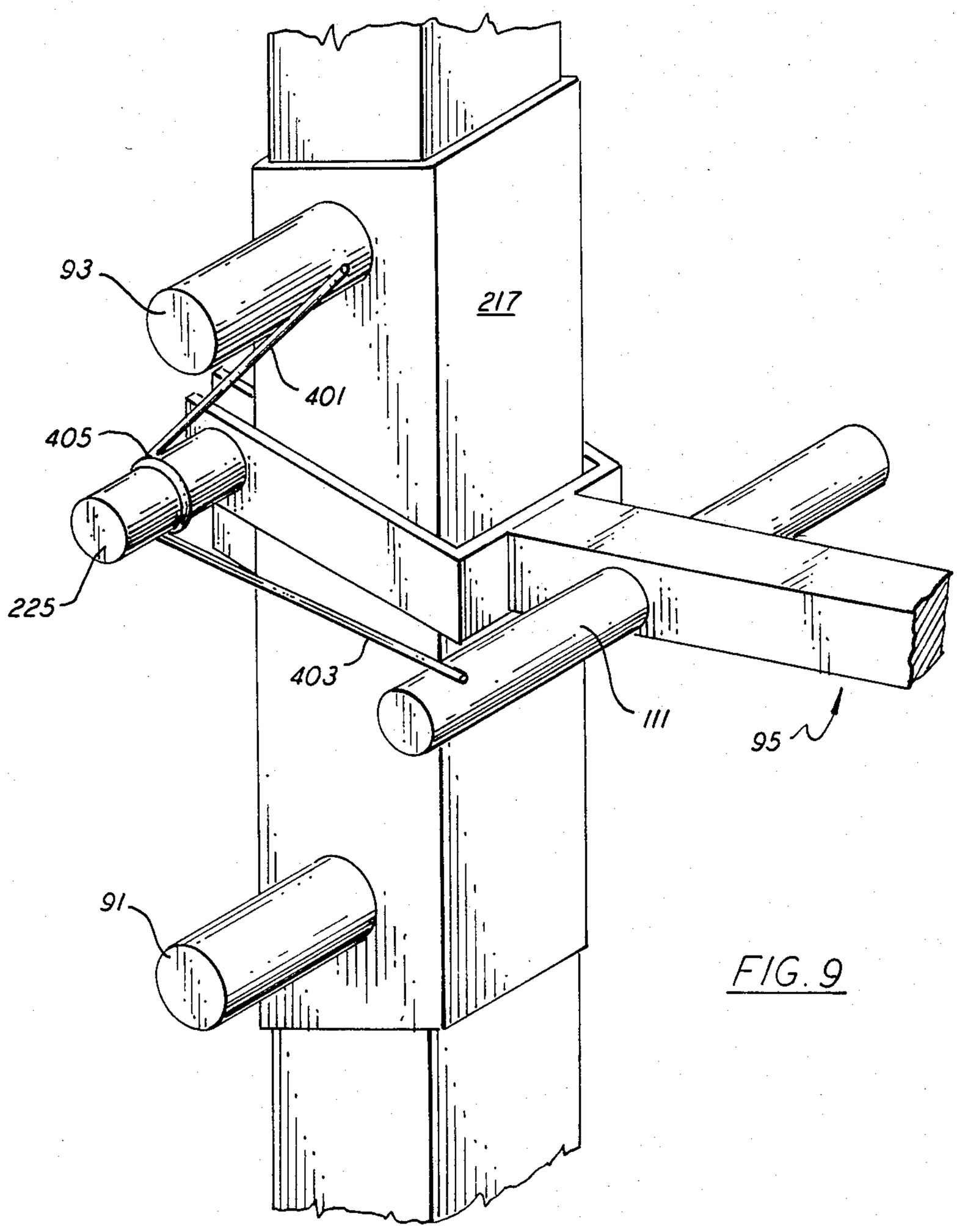

FIG. 9

RESILIENT TYPE EXERCISING DEVICE WITH REMOVABLE WEIGHTS

BACKGROUND OF THE INVENTION

In recent years, interest in physical fitness has dramatically increased, spawning interest in exercising and equipment aiding exercise. Although equipment to aid indoor physical exercise is available in gymnasiums, it is particularly convenient to have exercise apparatus available in the home. Typically, exercise equipment employs elements which are gripped or engaged by some part of the body and which offer resistance to the user's efforts to move them. Ideally, the amount of resistance may be varied to accomodate the strength and weight of the user. Fixed rods or bars are also of use in aiding exercises such as chin-ups, pull-ups and sit-ups. Large, expensive gymnasium-type exercise equipment is not well suited for home use by the average person. Compact, inexpensive and lightweight exercise apparatus is desirable for home use, yet the equipment must be both sturdy and versatile to justify its purchase. It is desirable that home exercise apparatus not employ weights lifted through a cable and pulley arrangement in order that excessive equipment weight may be avoided. Existing exercise equipment employing weights, cables and pulleys is either too light for effective exercise and muscle development and toning or too heavy for reasonable home installation and use.

A multi-purpose exercise device is described in U.S. Pat. No. 4,072,309 to Wilson. That device has a handled, angled lever arm. Opposite the handled end, a first pin passes through and is welded to the lever arm. Rigid fingers are welded to each end of the pin. The arm is pivotally attached to a vertical column by passing a second pin through the opposite end of both fingers and through one of a plurality of holes in a rail welded to the column. The arm may be held in a fixed position by yet another set of fingers which slip over the first pin and are then likewise pinned to rail on the column. Alternatively, elastic bands are slipped around the first pin and additional pins inserted in one of the holes in the rail to allow the arm to be pivoted against resistance. Regardless of how the Wilson device is set up, stress exerted by the user is concentrated undesirably on the welds between the lever arm and first pin. Stress exerted on the second pin tending to tear the rail from the column is not released or distributed to any other element of the device. Moreover, the lever arm is unstable with respect to moments lying in a vertical plane. An earlier patent, U.S. Pat. No. 3,989,241 to Ourgant, discloses exercising apparatus having a column and two sleeves slidable along it, one sleeve carrying a pivotally mounted lever arm and the other carrying a hanger bar with biasing means connected between the arm and bar.

SUMMARY OF THE INVENTION

In the present invention, compact, sturdy physical exercise apparatus which includes a vertical column and a generally horizontal bench is provided. In one embodiment, the column may be bolted to a wall and in another embodiment may be freestanding on a base. A lever arm extending from the column and having a handle is pivotally connected to a sleeve which slips over the column. The sleeve may be locked at a user-selected position along the column and a biasing means such as a torsion spring or an endless elastic band may be attached to the lever and sleeve. In that fashion a

resistance to pivoting the lever either up or down is selectably provided. The sleeve may also be used to lock or restrain the lever against pivotal movement toward the bench so that fixed bar exercises, such as chin-ups, pull-ups and sit-ups may be performed. If fixed weight exercises are desired, conventional weights may be slipped onto the ends of the lever handle. In the embodiment of the apparatus having a base, a cable adapter allows a cable to be attached to the lever arm so that exercises equivalent to those performed with weight and pulley apparatus may be performed. The lever includes a U-shaped yoke which fits around the sleeve for pivotal connection to flanges on the sleeve. Connection of the yoke to the flanges stabilizes the lever arm against moments lying in a vertical plane. The location on the lever for attaching the biasing means is spaced from the yoke so that stress applied during exercises is not concentrated on welds in the lever arm. The sleeve and flanges tend to distribute user-induced stresses to the column relieving the pivotal bearing of the lever from some of the stress it might otherwise have to withstand. Moreover, the sleeve may be quickly adjusted in position on the column so that a sequence of different exercises may be performed without substantial interruption.

In the embodiment of the apparatus having a base, another sleeve pivotally joins one end of the bench to the column allowing that end of the bench to be raised and lowered as desired. The pivotal connection is simply removed to allow separation of the bench from the sleeve. The other end of the bench is also pivotally and removably attached to the base. In the embodiment of the apparatus without a base, the bench may be attached to the column at one of several fixed locations. In all embodiments, the bench may be removed from the column for use of the apparatus independent of the bench. The bench may also be placed on the floor or astride or athwart the base, for use with the apparatus.

A sleeve is adjusted to the desired position on the column by aligning apertures in the sleeve and the column and inserting a snugly fitting pin in them. The pin is preferably spring-loaded to aid rapid adjustment of the sleeves between different positions on the column corresponding to its apertures. A safety means pins the lever arm sleeve to the column to prevent inadvertent movement of the sleeve on the column.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an embodiment of physical exercise apparatus according to the invention.

FIG. **2** is a side view of an embodiment of physical exercise apparatus according to the invention.

FIG. **3** is a side view of a portion of an embodiment of physical exercise apparatus according to the invention.

FIG. **4** is a sectional view of an embodiment of a locking means according to the invention.

FIG. **5** is a perspective view of an embodiment of a lever according to the invention.

FIG. **6** is a perspective view of an embodiment of a safety means according to the invention.

FIG. **7** is a perspective view of an embodiment of physical exercise apparatus according to the invention.

FIG. **8** is a perspective view of an embodiment of physical exercise apparatus according to the invention.

FIG. **9** is a perspective view of a portion of an embodiment of physical exercise apparatus according to

the invention showing an alternative embodiment of a biasing means.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The preferred embodiments of the physical exercise apparatus according to the invention are intended to be installed in a home on an essentially horizontal floor for the embodiment with a base or on an essentially vertical wall for the embodiment without a base. In those installations, many of the elements of the preferred embodiments described here are generally parallel to the floor and others are generally perpendicular to it. For ease of reference, elements which would be generally parallel to the floor in such installations are referred to here as transverse, whereas those generally perpendicular to the floor are referred to here as longitudinal. Likewise, dimensions measured in one of these directions are referred to here as transverse or longitudinal. In all the drawing figures referred to in this description, like elements are given the same reference numerals.

A perspective view of a preferred embodiment of physical exercise apparatus having a base is shown in FIG. **1**. An exercise apparatus **1** includes a transverse base **3** having two base sections **5** and **7**, preferably formed from identical cross section tubing having a planar side for floor contact. Preferably the tubing is formed of steel having a rectangular or square cross section. Base sections **5** and **7** are joined preferably by welding, so as to have a common transverse flat surface. Base sections **5** and **7** preferably form transversely the shape of the letter T. Both ends of base section **5** are free whereas one end of base section **7** joins at the center of section **5**. Preferably, a hole **9** is bored near one end of base section **5** into which a rod **11** may be inserted for aiding the performance of various exercises such as extended sit-up exercises. In each inside corner of the junction of base sections **5** and **7**, an L-shaped bracket **13** is joined along its sides, preferably by welding, to both sections **5** and **7**. The ends of brackets **13** near each free end of base section **5** each include a hollow cylindrical receptacle **15** for receiving a rod or tube.

A longitudinal column **17**, preferably of the same cross section as sections **5** and **7**, is joined, preferably by welding, to the end of section **7** opposite its junction with section **5**. Column **17** contains a plurality of longitudinally aligned transverse apertures **19** on a flat surface opposite the side of column **17** attached to base **3**. A rectangular bench **21**, preferably wooden, having opposing ends **23** and **25**, is transversely disposed, spaced from base **3** and joined to column **17**. Bench **21** is pivotally supported on base **3** near end **23** by support means. An embodiment of a support means includes a frame **27**, preferably tubular, generally in the form of a letter A with a flattened top. The frame includes generally longitudinal legs **29** having a transverse brace **31** near their ends and a transverse top section **33** which bears against bench **21** near end **23**. The ends of legs **29** are spaced to be received by receptacles **15**. A hollow box **35** is bolted to the side of bench **21** adjacent to frame section, i.e., the underside, by bolts **37** at a location between bench end **23** and frame **27**. Bolts **37** are preferably countersunk on the opposing surface of bench **21**. As end **25** of bench **21** is tilted, the separation between box **35** and frame **27** changes, box **35** acting as a limit on tilt angle when it contacts frame **27**. So long as end **25** of bench **21** is prevented from slipping, frame **27** provides an adequate pivotal support means for bench **21**. Near its center, bench **21** preferably includes a padded seat **39** for the comfort of the user.

End **25** of bench **21** is bolted by bolts **41** to a pair of angle brackets **43** disposed on the underside of bench **21**. Bolts **41** are preferably countersunk into the same surface of bench **21** as are bolts **37**. A sleeve **45** is disposed on and slidably engages column **17**. Preferably, sleeve **45** includes Teflon bearings (not shown) disposed on its inside surfaces to assist in its sliding on column **17**. Longitudinal flanges **47** and **49** are attached, preferably by welding, to sleeve **45** at the edges of the surface of sleeve **45** opposing the surface of column **17** containing apertures **19**. Flanges **47** and **49** contain two pairs of aligned flange bores **51** and **53**, only one of pair **51** being visible in FIG. **1**. Angle brackets **43** protrude from beneath bench **21** and straddle sleeve **45**. Brackets **43** have a pair of aligned bores **55**, only one of which is visible in FIG. **1**, alignable with flange bores **51** and **53**. In FIG. **1**, bores **51** and **55** are shown aligned and a T-handled key **57** is shown passing through them. Key **57** is of circular cross section, as are bores **51**, **53** and **55**, so that brackets **43** can pivot around key **57** as sleeve **45** slides along column **17**. In FIG. **1**, a removable rod **59**, useful in performing certain exercises, is shown inserted through flange bores **53**. A locking means for locking sleeve **45** in place at various locations along column **17** is installed on sleeve **45**. The embodiment of a locking means shown comprises a cylinder **61** joined, e.g., by welding, to sleeve **45**, and having a cap **63** joined to it, permanently or by screw threads. A pin means for engaging aligned apertures in sleeve **45** and column **17** includes a pin **65** and a T handle **67** at one of its ends. The mechanism of the embodiment of the locking means is most clearly shown in FIG. **4** which shows a cross section of the embodiment. Sleeve **45** has an aperture **69** which is alignable with any of the apertures **19** in column **17**. When aperture **69** is aligned with one of apertures **19**, as shown in FIG. **4**, pin **65** may protrude through and engage the apertures. A collar **71** on pin **65** limits the protrusion of pin **65** into the aligned apertures and acts as a bearing surface for an urging means for urging pin **65** into the aligned apertures. In FIG. **4**, the urging means, which is part of the pin means, is a helical spring **72** shown coaxially disposed about pin **65**. The opposite end of spring **72** bears on the inside of cap **63**. Thus, on withdrawal of pin **65** by pulling on handle **67**, sleeve **45** may be adjusted along column **17**. When the desired location is attained, the handle is released so that pin **65** engages and protrudes through aperture **67** on sleeve **45** and one of apertures **19**, thereby locking sleeve **45** in position.

Adjustment of the angle of bench **21** with respect to base **3** is simply accomplished by unlocking the locking means, for example, by withdrawing handle **67**, sliding sleeve **45** and releasing the handle when the desired position is attained. Support **27** supports bench **21** and allows it to slide toward or away from column **17**, as necessary, to permit the angular adjustment of the bench, i.e., allows it to pivot around frame top **33**. If present, rod **59** conveniently provides a handle for lifting or lowering sleeve **45** while handle **67** is retracted. As earlier noted, key **57** provides the pivot for end **25** of bench **21**. The T handle on key **57** aids withdrawal of the key either to shift the pivot point between flange bores **51** and **53** or to remove bench **21** entirely. As FIG. **1** makes clear, removal of key **57** allows angle brackets **43** to be slipped off sleeve **45** and bench **21** to

be lifted away from the apparatus. Bench **21** is installed by the same procedure in reverse order.

Preferably, a pair of shafts or bolts **73** are attached to bench **21** and protrude from its underside at approximately the midpoint between its ends **23** and **25**. Only one of the shafts is visible in FIG. **2**. As shown in FIG. **1**, section **7** of base **3** preferably includes a series of longitudinal holes **74**, sized and spaced to receive shafts **73**. Section **7** also contains transverse holes **75** sized to receive rod **59**. When rod **59** is in place through holes **75**, an exerciser may hook his feet beneath the rod to assist in performing exercises requiring substantial exertion. The longitudinal dimension of box **35** and angle brackets **43** are preferably the same as the longitudinal dimension of section **7**. With this preferred design, bench **21** can be removed as just described and placed athwart section **7** with shafts **73** engaging holes **74**. If the base is resting on a planar surface, box **35** and angle brackets **43** will support the ends of bench **21** while base section **7** supports its midpoint. In other words, bench **21** will be stably held in place across base section **7** for convenience and safety in performing standing exercises as explained elsewhere in this description.

Another sleeve **76** having the same shape in cross section as column **17** is disposed on and slidably engages column **17**. Sleeve **76** preferably includes Teflon bearings (not shown) disposed on its inside surface to assist its sliding on column **17**. Sleeve **76** includes longitudinal flanges **77** and **78** attached, preferably by welding, at the edges of the surface of sleeve **76** opposing the surface of column **17** containing apertures **19**. Flanges **77** and **78** contain opposed, aligned flange bores **79** and **81**, only one of flange bores **81** being visible in FIG. **1**. Sleeve **76** also includes locking means for locking it into place at a desired position along column **17**. Preferably, the embodiment of the locking means comprises a cylinder and handle assembly designated **83** which is identical to the embodiment of the locking means described for sleeve **45**, so that no further description is necessary. Sleeve **76** also incorporates a safety means which includes a rod **84**, bent approximately at a right angle, and having a collar **85** attached to it, and an overhanging lip **86** welded to sleeve **76**. Preferably, a lanyard **87** connects rod **84** to sleeve **76**. These parts are shown in greater detail in FIG. **6**. Rod **84** passes through aligned apertures in sleeve **76** and column **17** and may be rotated. Collar **85** limits the depth of insertion of rod **84**. Overhanging lip **86** blocks collar **85** so that rod **84** generally may not be withdrawn. Collar **85** is shown as circular with an asymmetrical portion where material has been removed outside a chord of the circle so that a flat portion **85***a* is formed. Flat portion **85***a* is dimensioned so as to cooperate with lip **86** and prevent rod **84** from being withdrawn except when flat **85***a* and lip **86** are properly aligned through the rotation of rod **84**. Lanyard **87** prevents rod **84** from falling to the floor, so that it is always handy for insertion in sleeve **76** and column **17**. Sleeve **76** contains an additional aperture, not visible in FIG. **6**, which aligns with one of apertures **19** when locking means **83** is engaging another of apertures **19**. When the safety means is engaged, rod **84** protrudes through the aperture in sleeve **76** which is not visible and through the aligned aperture **19** into column **17** as far as collar **85** permits. When rod **84** is in place, sleeve **76** cannot be moved. Thus, the safety means provides an extra measure of safety in the unlikely event the shaft in the locking means should fail. In addition, the safety mechanism prevent inadvertent adjustments of sleeve **76** should the locking means be accidentally or prematurely unlocked.

An important advantage of the sleeve adjustment, locking and safety means of the present invention is the ability to reposition a sleeve quickly during a sequence of exercises. One object of exercise routines is to achieve and maintain throughout the routine a target heartbeat rate. Maintenance of the target rate requires that there be no substantial interruption between a particular exercise and the next one. In contrast to other in-home exercise apparatus, the sleeve adjustment provided for in the present invention permits rapid and accurate positioning and repositioning of the bench and/or lever so that an essentially continuous sequence of exercises may be performed.

In the embodiments of the apparatus shown in FIGS. **1** and **2**, on opposite sides of sleeve **76**, which are adjacent to the side to which flanges **77** and **78** are attached, stop means **89** are attached, preferably by welding. Only one of stop means **89** is visible in FIGS. **1** and **2**, in the form of a bar, of rectangular cross section, attached at an angle lying between the longitudinal and transverse directions. Another stop means element is symmetrically located on the opposite side of sleeve **76**. Sleeve **76** also contains securing means for securing biasing means. In FIGS. **1** and **2**, these securing means appear in the form of pairs of opposing cylinders **91** and **93**, disposed at longitudinally opposing ends of sleeve **76**. Cylinders **91** and **93** are preferably closed on their ends and may be solid or hollow and are preferably welded to sleeve **76**.

In FIGS. **1** and **2**, a lever **95** is shown pivotally attached to flanges **77** and **78** by a pivot means. The pivot means includes a T handled shaft **97** of circular cross section which passes through a pair of the preferably circular, coaxial flange bores **79** and **81**, and also through a pair of preferably circular coaxial yoke bores **99** in lever **95**. Bores **99** are alignable with flange bores **79** and **81** and are preferably of the same size. Only one of bores **99** is visible in FIGS. **1** and **2**, but both are visible in the perspective view of lever **95** in FIG. **5**. As most clearly seen in FIG. **5**, lever **95** includes a U-shaped yoke **101**, having angular rather than curved corners, which is attached centrally at the base of the U to an arm **103**. Arm **103** and yoke **101** are preferably welded together. Yoke **101** has sufficient width to straddle sleeve **76**. As previously noted, the straddling portions contain bores **99** which are coaxial and alignable with flange bores **79** and **81** of flanges **77** and **78**. Arm **103** includes two elongated portions, arm portion **105** being joined at one end to yoke **101** and at its other end to arm portion **107**. The long axes of portions **105** and **107** intersect in arm **95** forming an obtuse angle between them. As shown in FIGS. **1** and **2**, when lever **95** is mounted on sleeve **76**, it extends over base **3** and the central, longitudinal axis of column **17** lies in the plane formed by the long axis of elongated arm portions **105** and **107**. At the end of arm portion **107** is attached a handle **109** which is transverse when lever **95** is installed on sleeve **76**. On arm portion **105**, spaced from the junction of yoke **101** and arm **103**, attachment means for attaching biasing means are joined to arm **103**. In the figures, an embodiment of a securing means for securing biasing means is shown in the form of opposing cylinders **111**, which are transverse when lever **95** is installed on sleeve **76**. Cylinders **111** preferably transversely extend beyond the maximum transverse dimension of yoke **101**.

In FIGS. 1, 2 and 3, various alternative attachments of lever 95 to sleeve 76 are shown. In FIG. 1, lever 95 is shown pivotally attached to sleeve 76, through shaft 97 which passes through lower flange bores 81 and bores 99 in yoke 101. Biasing means for providing resistance to pivotal movement of lever 95 are secured to securing means on sleeve 76 and the lever. In FIG. 1, an embodiment of the biasing means is shown as an endless elastic cord 113 which is looped over cylinder 111 and cylinder 91, cylinder 91 on sleeve 76 being the securing means on that sleeve lying nearer base 3. Only one elastic cord is visible in FIG. 1, but it is understood that cords are symmetrically placed on each side of sleeve 76 and that more than one cord may be used on each side of the sleeve to increase the resistance to pivoting. Commercially available elastic cords used in the aircraft industry having a latex interior with a woven covering and various spring constants are suitable for use with the apparatus. As FIG. 1 makes clear, arm 103 and yoke 101 are preferably angularly joined so that portion 105 of arm 103 is transverse when the set-up of FIG. 1 is established. Yoke 101, in FIG. 1, is drawn by the biasing means to rest against sleeve 76. The exerciser pushes on handle 109 to pivot lever 95 away from base 3, the pivotal motion being increasingly resisted by elastic cords 113 as those cords are extended.

In FIG. 3, a set-up of the embodiment of the apparatus is depicted in which resistance to pivotal motion of lever 95 toward base 3 is presented. Cords 113 are removed from cylinders 91 and looped over cylinders 93 instead. Cylinders 93 are disposed at the opposite end of sleeve 76 from cylinders 91. In this configuration there is resistance to pivoting of lever 95 toward base 3, opposite in direction to the resistance previously described. Lever 95 is drawn toward cylinder 93 by cords 113, but is restrained by stop 89.

In yet another set-up, which is shown in FIG. 2, elastic cords are not involved. To achieve that set-up from those of FIG. 1 or 3, cords 113 are removed and shaft 97 is withdrawn so that lever 95 is released. Lever 95 is then rotated 180° about the axis of arm portion 105 and yoke 101 replaced astride sleeve 73, and between cylinders 93 and stops 89. Yoke bores 99 are aligned with flange bores 79 and shaft 97 slipped through them. If no force is applied, yoke 101 will rest on stop 89 which restricts lever 95 in pivoting toward base 3. As a result, an exerciser may use handle 109 as a stationary bar to perform pull-up and chin-up exercises. As those skilled in the art will appreciate, the location of flange bores 79 and 81, 99 and stops 89, the mounting angle of stop 89 and the angle between yoke 101 and arm portion 105 are interrelated and must be coordinated in order to enable the achievement of the set-ups just described.

The apparatus may be adapted for use with conventional lifting weights by placing adapters (not shown) over the ends of handle 109 which are sized to engage the central hole in those weights. In addition, T handle adapters (not shown) may be slipped over the ends of handle 109 to provide hand grips perpendicular to handle 109. Grips in that direction aid in certain exercises such as side arm pull-ups and dips.

The angle in arm 103 is advantageously used in changing from the set-up of FIG. 1 to that of FIG. 2. The angle results in handle 109 being spaced farther from base 3 in the latter configuration which is desirable since there the exerciser is likely to be standing, whereas the exerciser may be sitting to use the apparatus in the other set-ups. The increased elevation may avoid the need to adjust the position of sleeve 76 on column 17 when a change in exercises is made. For some exercises, bench 21 may be in the way. It is desirable not only to remove it, but to place it across base section 7, in the manner disclosed elsewhere in this description, so that the user may stand on it when doing the stand-up exercising. Such use of the bench provides additional protection against tipping of the apparatus when the user is pivoting the lever away from the base.

Turning to FIG. 7, a perspective view of another embodiment of exercise apparatus according to the invention is shown. In FIG. 7, only the elements described below are numbered. Unless stated otherwise, the elements in the figure are identical to those previously described in connection with other figures. In FIG. 7, bench 21 has been removed from sleeve 45 and placed astride base section 7 so that it projects over base section 5 away from column 17. As is clear from FIGS. 1 and 2, angle brackets 43 attached to the underside of bench 21 are separated by the width of sleeve 45. In FIG. 7, the space between base section 7 and brackets 43 is occupied by the arms of a cable adapter 201, having a U shape but with angled rather than curved corners, which is part of an embodiment of a cable adapting means for adapting the exercise apparatus for use as a cable-type exerciser. Adapter 201 has aligned holes (not visible) in its arms sized to receive rod 59 for attachment to base section 7. Rod 59 is inserted through bores 55 in brackets 43, the holes in adapter 201 and holes 75 in base section 7, all of which are aligned, to attach these parts together. Adapter 201 has a base 203 which is attached upwardly to base section 7 toward column 17. A pulley 205 is attached by a screw eye 207 to adapter base 203. A cable 209 having ends formed into loops 211 and 213 is threaded through pulley 205. Loop 211 is looped over handle 109. A rod, such as rod 11, is inserted through loop 213. An exerciser standing or sitting on bench 21 gripping rod 11 and pulling on cable 209 may perform exercises such as curls or rowing machine exercises, with the biasing means providing the exercising resistance and force. The function of a cable and weight exercise apparatus is thus achieved in the inventive apparatus without the use of weights.

FIG. 7 also includes a sleeve 217 which is another embodiment of sleeve 76 of FIGS. 1 and 2. Column 17 of FIG. 7 includes station numbers 215 printed on and spaced longitudinally along the column. Sleeve 217 of FIG. 7 includes a sight hole 219 located so that one of station numbers 215 is visible whenever sleeve 217 is locked in place along column 17 as previously described. The station numbers allow the user to adjust the position of the sleeve, yet repeatably return to a former position easily.

Sleeve 217 has a pair of flanges 221, only one of which is visible in FIG. 7, which contain one pair of coaxial flange bores 223, (not visible) in contrast to the pairs of such bores on sleeve 76. A cylinder 225, which may be a tube or, preferably, a rod, preferably circular in cross section, fits through the flange bores and yoke bores 99 of lever 95, to pivotally connect the lever and sleeve. No stop means such as stop means 89 of FIGS. 1 and 2 is provided. In this embodiment, it is not necessary to invert lever 95 to perform chin-ups, etc. Rather, a biasing means having a high resistance constant, e.g. 600 pounds per inch, is used. The average exerciser will cause lever 95 biased with that much resistance to move only slightly, so the necessity for inverting and stopping lever 95 is eliminated. Furthermore, in this embodiment

of the apparatus the delay in removing and inverting lever **95** is eliminated so that the various sequences of an exercise routine are not interrupted and the target heart rate may be maintained.

In FIG. **8**, still another embodiment of apparatus according to the invention is shown. The embodiment of FIG. **8** includes a longitudinal column **301** which is mounted in a conventional manner on a wall through the use of four angle brackets **303**. The brackets bolt to column **301** and to the wall. The brackets offset column **301** sufficiently from the wall so that the lever **95** can be freely pivoted. This embodiment does not need a base, but may be adapted to a floor model by the addition of a base adapter **305** as indicated by the broken lines. Base adapter **305** is formed in a T shape, like base **3** of FIG. **1**, and has a longitudinal receptacle **306** into which the end of column **301** snugly fits for attachment. Holes **307** in receptacle **306** are aligned with corresponding holes **307** in column **301** for bolting the base adapter to the column. Column **301** includes a sleeve **309**, essentially identical to the sleeve **217** of FIG. **7** except for the differences that are described in this paragraph. Station numbers **311** are distributed along a surface of column normal to the axis of rotation of lever **95**. As a result, a sight hole **313** is located in an opposing surface of sleeve **309**. A locking means, like the embodiment described in reference to FIGS. **1** and **4**, is used to lock sleeve **309** into position along column **301**. However, the locking means embodiment **315** shown in FIG. **8** is moved to the surface of sleeve **309** opposing bench **21** in order to be accessible. Likewise, the embodiment of a safety means, like the embodiment shown in FIGS. **1** and **6**, shown as element **317** in FIG. **8**, is moved to the same surface. Bench **21**, which is not shown in FIG. **8**, is not attached to a sleeve. Instead, one of a plurality of pairs of coaxial bores **319** in column **301** receives a key **57** which passes through bores **55** in brackets **43** to connect bench **21** to column **301**. Obviously, the position of the bench may be adjusted by selecting different bores **319** for alignment with those of brackets **43**. The bench is removed as previously described. The other end of bench **21** is supported by conventional support means such as legs or a U-frame fixedly attached to the underside of the bench.

In FIG. **9**, another embodiment of a biasing means is shown installed on sleeve, such as sleeve **217** of FIG. **7**. In this embodiment, rod **225**, which is an embodiment of the pivoting means previously described, has no T handle. Rod **225** projects beyond the transverse dimensions of sleeve **217**. The embodiment of the biasing means comprises first and second coil arms **401** and **403** extending from a helical coil **405**. Preferably, the coil and arms are formed from a single spring steel member appropriately tempered. Coil **405** is secured to rod **225** by slipping it over one end of rod **225**. Coil arms **401** and **403** are secured to the securing means by friction. To install the biasing means, pressure is placed on coil arms **401** and **403** bringing them slightly closer together so that they may be slipped into contact with the securing means. This embodiment of a biasing means bears on one of cylinders **111** on lever arm **95** and one of cylinders **91** or **93** on sleeve **217**, depending on the direction in which lever arm **95** is to be biased. The coil embodiment biasing means provides a torsional resistance to the movement of lever arm **95** in the direction selected for exercise. As lever **95** is operated, the coil arms resist displacement by the torsional reaction force produced by coil **405**. The coils are preferably mounted in matched pairs on opposite sides of column **17** to provide balanced exercising force resistance. More than one coil may be mounted on each side of column **17** to increase the exercising force resistance.

Regardless of which of the set-ups of FIGS. **1**, **2**, **3**, **7**, **8** or **9** are used, with the present apparatus employing a lever pivoted on two flanges mounted on a sleeve, a force applied to handle **109** will produce a moment force on sleeve **76**, **217** or **309** causing it to rotate. The rotation is limited by the bearings between the sleeve and column and the rotational force is borne by the bearings and/or transverse edges on column **17** or **301**. That is, the applied stress will be distributed and relieved by column **17** or **301** rather than being applied and concentrated at the pivot of lever **95** or on longitudinal flanges **77** and **78** or **221**. Moreover, when biasing means are used, as shown in FIGS. **1**, **3**, **7** and **9**, the stresses where arm **103** joins yoke **101** are reduced in comparison to other devices because the biasing means attachment point is spaced from that junction. When biasing means are not used, as in FIG. **2**, the moment is applied to stop **89** and throughout lever **95** without the concentration at the junction of yoke **101** and arm **103** which would occur if arm **103** were restrained at that junction.

The invention has been described with reference to certain preferred embodiments. As will be appreciated by those with skill in the art, various modifications, substitutions and additions may be made without departing from the spirit of the invention. Therefore, the scope of the invention is limited solely by the following claims.

I claim:

1. Apparatus for physical exercise comprising:
a longitudinal column,
a first sleeve slidably engaging said column, said sleeve including first securing means for securing a biasing means to said sleeve,
first locking means for locking said first sleeve at a selected position along said column,
a lever transversely, pivotally connected to said first sleeve, said lever comprising: a yoke straddling said first sleeve and containing coaxial transverse yoke bores; an arm joined to said yoke centrally; and second securing means joined to said arm for securing a biasing means to said arm,
pivot means passing through said yoke bores and said first sleeve for pivotally connecting said first sleeve and said lever,
biasing means securable to said first and second securing means for providing resistance to pivotal movement of said lever,
wherein said pivot means comprises a cylinder extending through said yoke bores and said biasing means comprises a helical coil encircling said cylinder, said coil having first and second coil arms for bearing on said first and second securing means, respectively.

2. The apparatus of claims **1** or **5** wherein said first and second securing means comprise opposing transverse cylinders.

3. The apparatus of claim **2** wherein said first securing means comprises opposing transverse cylinders disposed at opposing longitudinal ends of said first sleeve.

4. Apparatus for physical exercise comprising:
a longitudinal column,

a first sleeve slidably engaging said column, said sleeve including first securing means for securing a biasing means to said sleeve,

first locking means for locking said first sleeve at a selected position along said column,

a lever transversely, pivotally connected to said first sleeve, said lever comprising: a yoke straddling said first sleeve and containing coaxial transverse yoke bores; an arm joined to said yoke centrally; and second securing means joined to said arm at a location spaced from the junction of said arm and said yoke for securing a biasing means to said arm,

wherein said first sleeve includes two longitudinal flanges each containing a transverse flange bore, said flange bores being coaxial, said yoke and flange bores being mutually alignable, and further including pivot means passing through said aligned yoke and flange bores for pivotally connecting said first sleeve and said lever, and

biasing means securable to said first and second securing means for providing resistance to pivotal movement of said lever.

5. The apparatus of claim **4** wherein said biasing means comprises endless elastic cords.

6. Apparatus for physical exercise comprising:

a longitudinal column,

a first sleeve slidably engaging said column, said sleeve including first securing means for securing a biasing means to said sleeve,

first locking means for locking said first sleeve at a selected position along said column,

a lever transversely, pivotally connected to said first sleeve, said lever comprising: a yoke straddling said first sleeve and containing coaxial transverse yoke bores; an arm joined to said yoke centrally; and second securing means joined to said arm at a location spaced from the junction of said arm and said yoke for securing a biasing means to said arm,

wherein said first sleeve includes two longitudinal flanges each containing a transverse flange bore, said flange bores being coaxial, said yoke and flange bores being mutually alignable, and further including pivot means passing through said aligned yoke and flange bores for pivotally connecting said first sleeve and said lever,

a transverse base attached to said column,

a transverse bench disposed above said base and having first and second opposing ends,

support means attachable to said base and pivotally connected to said first end of said bench for supporting said bench,

a second sleeve slidably engaging said column and pivotally attached to said second end of said bench, and

second locking means for locking said second sleeve at a selected position along said column.

7. The apparatus of claim **6** wherein said second locking means comprises a plurality of longitudinally aligned apertures in said column, an aperture in said second sleeve alignable said apertures in said column, and pin means for engaging aligned apertures in said second sleeve and said column.

8. The apparatus of claim **7** wherein said pin means further comprises a pin and urging means for urging said pin into said apertures.

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